

(3 Hours)

Marks : 80

- N.B.: (1) Q. 1 is compulsory.
 (2) Attempt any four out of remaining six.
 (3) Figures to the right indicate full marks.

Q 1A) Explain in detail simulation application in any one of the following system. [10]
 (i) Customer flow analysis in super market..
 (ii) Vehicle flow analysis at petrol pump

B) Consider a drive in restaurant where carhops take order and bring food to the car. Car arrives according to the interarrival distribution of cars. There are two carhops, Able and Baker. The distribution of their service time is also given. [10]

Interarrival time of cars (min)	1	2	3	4
Probability	0.25	0.40	0.20	0.15

Able's Service Time (min)	1	2	3	4
Probability	0.30	0.30	0.25	0.15

Baker's Service Time (min)	1	2	3	4
Probability	0.35	0.25	0.20	0.20

Develop the simulation table and analyse the system by simulating the arrival and service of 8 customers. Assume that the first customer is arriving to system at 0th time. Random digits for interarrival time and service are given below:

Customer No	1	2	3	4	5	6	7	8
RD for Interarrival Time	---	94	77	49	45	43	32	49
RD for Service Time	80	20	15	88	98	65	86	73

Q 2.A) Consider the following sequence of 30 numbers. [07]

0.29	0.26	0.92	0.73	0.14	0.26	0.39	0.66	0.54	0.15
0.91	0.48	0.02	0.55	0.67	0.09	0.30	0.24	0.12	0.59
0.96	0.34	0.91	0.84	0.21	0.33	0.87	0.18	0.79	0.56

Test whether 2nd, 8th, 14th, numbers in the sequence are auto correlated where $\alpha = 0.05$ (given $Z_{0.025} = 1.96$)

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- B) Explain the flow diagram that shows the various steps involved in simulation study [08]
- Q 3A) A medical examination is given in 3 stages by a physician. Each stage is exponentially distributed with a mean service time of 20 mins. Find the probability that the exam will take 50 mins or less. [07]
- B) What do you mean by pseudo random number? Describe the random numbers generation? [08]
- Q 4A) Discuss multivariate and Time-Series Input Models [07]
- B) A college professor is leaving home for summer but would like to have a light bulb burning at all times to discourage burglars. The professor rigs up a device that will hold two light bulbs. The device will switch the current to the second bulb if the first bulb fails. The box in which the light bulbs are packaged says "Average life 1000 hours, exponentially distributed." The professor will be gone 90 days (2160 hours). What is the probability that a light will be burning when the summer is over and the professor returns? [08]
- Q 5A) The percentage of distribution of income size into 10 parts 15.5, 22.9, 16.6, 3.5, 30.5, 6.6, 12.8, 1.7, 9.9 and 13.3. Determine the maximum likelihood estimators μ and σ^2 . [07]
- B) What are the methods used to generate random numbers? Explain with the help of example [08]
- Q 6A) Explain validation of model assumptions in short. [07]
- B) Derive the inverse transformation method for Weibull distribution [08]
- Q 7 Write a short note on following (Attempt any Three)_ [15]
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| i) Static or Monte Carlo simulation | iii) Advantages and disadvantages of simulation |
| ii) Steady state simulations | iv) Poisson distribution. |
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